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REDUNDANT HINGE ELEMENT FOR A NOTEBOOK COMPUTER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to hinges that are adapted to provide pivotal connection between casings of a notebook computer.

2. Description of Related Art

Hinge devices are used for providing pivotal connection between different parts of casings of an apparatus. In certain applications, these pivoting parts must also have the capability of being held fast intermittently with respect to one another in varying orientations. As an example, in a laptop computer having a tiltable lid, the lid is capable of being tilted through a range of angles, but is able to remain fixed in a particular inclination that an operator selects to provide optimum visibility of the computer screen.

However, most hinges for notebook computer suffer from a number of deficiencies. For example, most hinges do not allow for more than 180 degrees of rotation between the base and lid (e.g., screen and keyboard). Moreover, even if the screen and keyboard are open to 180 degrees, the device is not truly flat due to the "stepped" area underneath the screen where it attaches to the keyboard. Further, the geometry and mechanical requirements of the standard pivot hinge contribute to the overall thickness of the notebook computer. Thus, there is a need in the art for an improved hinge that eliminates these deficiencies.

SUMMARY OF THE INVENTION

To overcome the limitations in the prior art described above, and to overcome other imitations that will become apparent upon reading and understanding the present specification, the present invention discloses a redundant hinge element and a hinge assembly made from the redundant hinge element that are adapted to provide pivotal connection between casings of a notebook computer, laptop computer, handheld computer, palmtop computer, or other appliance.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the drawings in which like reference numbers represent corresponding parts throughout:

FIG. 1 illustrates a notebook computer constructed in accordance with an embodiment of the invention;

FIG. 2A shows a first perspective view of a redundant hinge element and FIG. 2B shows an orthogonal (front) view of part of the redundant hinge element;

FIG. 3A shows a first perspective view of the hinge array comprised of a plurality of interlocking redundant hinge elements and FIG. 3B shows a first axial cross-sectional view of the hinge array of interlocking redundant hinge elements;

FIG. 4A shows a second perspective view of the hinge array and FIG. 4B shows a second axial cross-sectional view of the hinge array;

FIG. 5 illustrates a notebook computer constructed in accordance with an embodiment of the invention wherein the notebook computer is opened to 180 degrees of rotation between the base and lid; and

FIG. 6 illustrates a notebook computer constructed in accordance with an embodiment of the invention wherein the notebook computer is fully opened to 360 degrees of rotation between the base and lid.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, reference is made to the accompanying drawings which form a part hereof, and which is shown, by way of illustration, several embodiments of the present invention. It is understood that other embodiments may be utilized and structural changes may be made without departing from the scope of the present invention.

DESCRIPTION OF THE NOTEBOOK HINGE

FIG. 1 illustrates a notebook computer **10** constructed in accordance with an embodiment of the invention, wherein the notebook computer **10** includes a base **12** that incorporates a keyboard **14** and a lid **16** that incorporates a screen **18**, wherein the base **12** and lid **14** are coupled together with a hinge assembly **20**. The hinge assembly **20** allows the lid **16** to be tilted and positioned with respect to the base **12** in an almost unlimited range of inclinations between a closed position and a maximum open position. When closed, the lid **16** forms a protective enclosure for the keyboard **14** and screen **18**, as well as a protective cover for the other components inside the base **12**. When opened, the lid **16** may be tilted at a range of angles relative to the base **12**, so that the screen **18** is viewable to an operator. Generally, the operator will tilt the lid **16** to an inclination that provides optimum visibility of the screen **18**.

It is understood that the invention may be incorporated into many types of apparatus, so long as they utilize similar bases **12** and tiltable lids **16** or other components. For example, the base **12** may incorporate a digitizing pad rather than the keyboard **14**; the base **12** may incorporate the screen **18** rather than the keyboard **14**; the screen **18** itself may comprise a touch screen or digitizing pad, etc. Thus, the present invention could be used with laptop computers, handheld computers, palmtop computers, etc., as well as any number of other electronic devices. The present invention is particularly relevant to appliances or apparatus which incorporate a component that is able to be tilted and positioned in a range of orientations to suit the preference of a user. However, for convenience, the concepts of the present invention are illustrated, by way of example only, in a hinge assembly **20** that is incorporated in the casing of a notebook computer **10**.

FIG. 2A shows a perspective view of a redundant hinge element **22**, a plurality of which are assembled together in an array to create the hinge assembly **20** (as described in more detail below), and FIG. 2B shows an orthogonal (front) view of part of the hinge element **22**. Each redundant hinge element **22** is comprised of a cylindrical portion **24** that may have a hollow or solid cross-section, and a cylindrical slot portion **26** that is partially open to accept the cylindrical portion **24** of an adjacent, interlocking, redundant hinge element **22**. The cylindrical portion **24** may include one or more cable raceways **28** and the cylindrical slot portion **26** may include multiple retention wings **30**. One or more pass-thru slots **32** may be present in a connecting portion **34** between the cylindrical portion **24** and the cylindrical slot portion **26**.

FIG. 3A shows a first perspective view of the hinge assembly **20** comprised of a plurality of interlocking redundant hinge elements **22** and FIG. 3B shows a first axial cross-sectional view of the hinge assembly **20** of interlocking redundant hinge elements **22**. These views illustrate the engagement of the cylindrical portion **24** of a second redundant hinge element **22** with the cylindrical slot portion **26** of a first redundant hinge element **22**.